is one point about the figures that I should like to mention. No results were calculated till long after the completion of the last experiment. Had I known how the figures were coming out, it would have been impossible to have been biassed in taking the periods and deflections. Even the calculating boys could not have discovered whether the observed elongations were such as would give a definite point of rest. I made my observations, and the figures were copied at once in ink into the books, where afterwards they left my hands and were ground out by the calculating machine. The agreement, such as it is, between my results is therefore in no way the effect of bias, for I had no notion till last May what they would be.

No. of Exp.	Lead balls			Gold balls		Neutral lid reading	Date	Deflection	Geometrical factor	Stiffness of fibre.	Result	
	Arch side	Wall side	Shellac spots	Arch side	Wall side						G	Δ
				1·3 grammes each			1892			·00	·0000000	
3	2 low	1 high	Inwards	4 low	3 high	267°	Oct. 1–30,	5637·3	6089·89	245483	66645	5·5213
				Gold balls of double weight			1893					
4	2 low	1 high	Inwards	4 low	3 high	267	Aug. 15– Sept. 3				66702	5·5167
5	1 high	2 low	Inwards	3 high	4 low	86·5	Sept. 4–11	3667·6	12423·8	772200	66711	5·5159
6	2 low	1 high	Inwards	4 low	3 high	265·9	Sept. 12–14	3667·7	12422·3	Same as No. 8	66675	5·5189
7	2 low	1 high	Outwards	4 low	3 high	265·9	Sept. 15	3664·0	12432·8		66551	5·5291
8	1 low	2 high	Inwards	4 low	3 high	265·9	Sept. 16–18	3695·2	12534·2	771664	66575	5·5271
				Gold cylinders								
9	1 low	2 high	Inwards	3 low	1 high	86	Sept. 27– Oct. 3	5775·5	18800·5	739988	66533	5·5306
							1894					
10	1 low	2 high	Inwards	4 low	3 high	85·25	Jan. 1–13	3515·4	12531·8	811011	66578	5·5269
11	1 low	2 high	Inwards	4 low	3 high	85·25	Jan. 14		Hydrogen experiment			
12	2 high	1 low	Inwards	3 high	4 low	265·2	Jan. 17–21	3520·5	12533·7	811385	66695	5·5172
									Adopted result ...		66576	5·5270

My conclusion is that the force with which two spheres weighing a gramme each, with their centres 1 centimetre apart, attract one another, is $6{\cdot}6576 \times 10^{-8}$ dynes, and that the mean density of the earth is 5·5270 times that of water.

It is evident, from what I have already said, that this work is of more than one-man power. Of necessity I am under obligations in many quarters. In the first place, the Department of Science and Art have made it possible for me to carry out the experiment by enabling me to make use of apparatus of my own design. This belongs to the Science Museum, where I hope in time to set it up so that visitors who are interested may observe for themselves the gravitational attraction between small masses. Prof. Clifton, as I have already stated, has given me undisturbed possession of his best observing room, his only good underground room, for the last four years. The late Prof. Pritchard lent me an astronomical clock. Prof. Viriamu Jones enabled me to calibrate the small glass scale on his Whitworth measuring machine; and Mr. Chaney did the same for my weights. I would especially refer to the pains that were taken by Mr. Pye, of the Cambridge Scientific Instrument Company, to carry out every detail as I wished it, and to the highly skilled work of Mr. Colebrook, to which I have already referred. Finally, I am under great obligations to Mr. Starling, of the Royal College of Science, who performed the necessarily tedious calculations.

In conclusion, I have only to say that while I have during the last five years steadily and persistently pursued this one object with the fixed determination to carry it through at any cost, in spite of any opposition of circumstance, knowing that by my discovery of the value of the quartz fibre, and my development of the design of this apparatus, I had, for the first time, made it possible to obtain the value of Newton's Constant with a degree of accuracy as great as that with which electrical and magnetic units are known, though I have up to the present succeeded to an extent which is greater, I believe, than was expected of me, I am not yet entirely satisfied. I hope to make one more effort this autumn, but the conditions under which I have to work are too difficult; I cannot make the prolonged series of experiments in a spot remote from railways or human disturbance; I cannot escape from that perpetual command to come back to my work in London; so I must then leave it, feeling sure that the next step can only be made by my methods, but by some one more blest in this world than myself.

SCIENCE IN THE MAGAZINES.

IN the August magazines received by us, science is but poorly represented. A brief mention of the more important articles will therefore be sufficient this month.

Mr. Benjamin Kidd's work on "Social Evolution" has furnished material for much criticism. In the *National Review* Mr. Francis Galton, F.R.S., discusses the part of religion in human evolution as set down in the book; and Mr. Kidd adds a short note on the opinions expressed in the article. The same magazine contains a paper on "Sleeplessness" by Mr. A. Symons Eccles, and one on "Colliery Explosions and Coal Dust," by Mr. W. N. Atkinson. "An experience of fifteen years in investigating explosions in coal-mines has led him to believe that "coal-dust has been the chief, or only, agent in all recent widespread colliery explosions." It is regretted that "no experiments have been made on a scale large enough to yield visual demonstration of the effect of an explosion of coal-dust, under conditions approximating as closely as possible to those existing in mines. The nearest approach to such experiments in this country were those recently made by Mr. H. Hall, H.M. Inspector of Mines, in an old pit shaft fifty yards deep. The length of such a shaft is insufficient to develop the whole force of a coal-dust explosion, and the conditions under which the explosions or ignitions took place were necessarily different from those obtaining in the practical working of mines. These experiments, however, are valuable, as demonstrating that the dust ordinarily existing in a great number of mines (not particular exceptional coal-dusts) are capable of propagating flame to the full limits admitted by the conditions of the experiments."

A psychological paper, entitled "How We Think of Tones and Music," is contributed to the *Contemporary* by Mr. R. Wallaschek. Mr. Andrew Lang tilts at Prof. Huxley's treatment of the Bible story of Saul and the Witch of Endor "as a piece of evidence bearing on an important anthropological problem," and treats the matter from a less scientific point of view.

Eight recent books on Iceland furnish the subject of an interesting account of the island in the *Quarterly Review* (No. 357). The same publication contains a long article on "Forestry," in the course of which the author says that the three great faults noticeable in the treatment of woods in Great Britain are: (1) Discrimination has seldom been shown with regard to the choice of the kinds of trees for given soils and

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situations. (2) Plantations have not usually been formed of the best degree of density for the given kinds of trees selected for planting. (3) A sufficient density of crop has not always been maintained during the subsequent periods of the natural development of the trees. It is finally concluded that—"Better results than can at present be reasonably expected would probably be obtained if State aid were freely granted towards the dissemination of sound instruction concerning sylviculture; and the only proper places for bringing this within the reach of the future landowners, and of young men of good education, are undoubtedly the great Universities."

Messrs. T. G. Allen and W. L. Sachtleben continue, in the *Century*, the description of their journey "Across Asia on a Bicycle," from Constantinople to Pekin. Dr. W. T. G. Morton's claims to the discovery of anæsthesia are championed by Mr. E. L. Snell. It will be remembered by readers of this monthly summary that the January number of the *Century* contained an article in which Miss E. B. Simpson told the story of her distinguished father's discovery of the anæsthetic properties of chloroform in 1847. It is now shown that, in the preceding year, Dr. Morton publicly demonstrated the use of sulphuric ether in producing anæsthesia, at the Massachusetts General Hospital.

A passing mention will suffice for the remaining articles of scientific interest in the current magazines. Mr. A. H. Savage-Landor describes a visit to Corea, in the *Fortnightly*. Some of the possibilities of the phonograph are foreshadowed in *Scribner*, by Octave Usanne. *Longman's Magazine* contains "White Sea Letters, 1893," by Mr. A. Trevor-Battye. Naturalists will find the letters interesting. Under the title "Land Crabs," Mr. E. Step contributes to *Good Words* a popular description of such terrestrial crustaceans as *Gecarcinus ruricola* and various members of the genus *Gelasimus*. Finally, the vivisection controversy is continued in the *Humanitarian*, and the man-like apes in the Gardens of the Zoological Society are described in the *English Illustrated*.

SOCIETIES AND ACADEMIES.

London.

Royal Society, June 21.—"Researches on the Structure, Organisation, and Classification of the Fossil Reptilia. Part IX. Section 4. On the Gomphodontia." By H. G. Seeley, F.R.S.

"On an Instrument for Indicating and Measuring Difference of Phase between E.M.F. and Current in any Alternating Current System." By Major P. Cardew, R.E.

"On the Difference of Potential that may be established at the Surface of the Ground immediately above and at various Distances from a Buried Mass of Metal Charge from a High Pressure Electric Light Supply." By Major Cardew, R.E., and Major Bagnold, R.E.

Paris.

Academy of Sciences, August 13.—M. Lœwy in the chair.—The death of M. Gustave Cotteau (August 10) was announced; the deceased correspondent was an authority on sea-urchins.—Note on the long-period meteorograph to be placed in Mont Blanc Observatory, by M. J. Janssen. A description is given of the arrangements for automatically registering during eight months the indications of the barometer, thermometer, and hygrometer, and the speed and direction of the wind.—New researches on the infra-red region of the solar spectrum, by M. Langley. The author shows that a perfected arrangement of the bolometer is able, by means of automatically photographing the movements of the galvanometer needle, to furnish a complete record in an hour of the infra-red region of the solar spectrum with very great accuracy. The accuracy obtained is illustrated by the case of the D lines in the visible part of the spectrum; the method indicates very clearly the Ni line occurring between D_1 and D_2. Crystals collect at the upper part of a less dense solution, by M. Lecoq de Boisbaudran. If a saturated solution of carbonate and thiosulphate of sodium be saturated with sodium sulphide ($Na_2S.9H_2O$) and a quantity of the latter placed at the bottom of the solution and a small fragment supported near the surface, in the course of a few days or weeks the additional sodium sulphide is found collected round the fragment on the support. By the solution of the crystallised sulphide the bulk of the solution increases in a greater ratio than the weight, and hence its specific gravity is lowered.—A new use of Plücker's conoid, by M. A. Mannheim.—New arithmetical theorems, by Père Pepin.—Remarks on the electrochemical graphic method of studying alternating currents, by M. A. Blondel.—Application of auto-collimation to the measurement of indices of refraction, by M. Féry.—On the specific heat of liquid sulphurous anhydride, by M. E. Mathias. A general method is described. The true specific heat of liquid sulphur dioxide is always positive and increases constantly and indefinitely with the temperature. A table is given showing the value of m between $-20°$ and $+155{\cdot}5°$. Between $-20°$ and $+130°$, $m = 0{\cdot}31712 + 0{\cdot}0003507t + 0{\cdot}000006762t^2$. At $155{\cdot}5°$, $m = 2{\cdot}980$.—On benzoylquinine, by M. A. Wunsch. The base has been obtained in clear, colourless prisms, insoluble in water. It dissolves easily in alcohol, benzene, chloroform, petroleum ether, carbon bisulphide, and ether. It has the composition $C_{20}H_{23}(C_6H_5CO)N_2O_2$, and melts at 139° without decomposition. The following salts have been examined: the basic and normal hydrochlorides, and the basic salicylate, tartrate, and succinate.—On the heart in some orthoptera, by M. A. Kowalevsky.—On the perithecæ of the vine mildew (*Uncinula spiralis*), by M. Pierre Viala. The abundance of perithecæ found in 1893 fully confirms the identity of *Erysiphe Tuckeri* with *Uncinula spiralis*. The parasite noted by Bary on the conidiophores of mildew, *Cicinnobolus Cesatii*, was abundantly developed in 1893 in the perithecæ of *Uncinula spiralis*. The author also describes a peculiar parasitic bacterium.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Books.—Alembic Club Reprints, No. 7—The Discovery of Oxygen, Part 1; Dr. J. Priestley (Edinburgh, Clay).—Annual Report of the Department of Mines and Agriculture, New South Wales, 1893 (Sydney, Potter).—Hygiene: Dr. J. L. Notter and R. H. Firth (Longmans).

Pamphlets.—Ueber den Osmotischen Druck von Lösungen von endlicher Konzentration: T. Ewan (Leipzig).—The Glaciation of the West of Scotland: D. Bell (Glasgow).—On the Selection of suitable Instruments for Photographing the Solar Corona during Total Solar Eclipses: A. Taylor (Dublin).—Les Grands Instruments de L'Avenir par M. Alvan Clark et la Fabrication des Grands Objectifs d'Astronomie par M. Mantois (Paris).

Serials.—Journal of the Franklin Institute, August (Philadelphia).—Michigan State Agricultural College Experiment Station, Horticultural Department, Bulletin 3 (Michigan).—Journal of the College of Science, Imperial University, Japan, Vol. 6, Part 4, and Vol. 7, Part 1 (Tōkyō).—Mittheilungen der Deutschen Gesellschaft für Natur und Völkerkunde Ostasiens in Tokio, Supplement, Heft 1, zu Band 6 (Tokio).—Royal Natural History, Part 10 (Warne).—Journal de Physique, August (Paris).—L'Anthropologie, tome 5, No. 4 (Paris).

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